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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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## FULL CONTENTS

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### [Claim(s)]

[Claim 1]A welding robot which has the following and is characterized by attaching this feeding device in the direction which decreases curvature of said \*\*\*\* pipe to said arm so that displacement is possible.

An arm provided by a joint movement so that displacement to the free direction was possible.

A welding machine which is attached at a tip of this arm and welds using a wire-like welding cable core.

A feeding pipe which has the flexibility in which said welding cable core is inserted.

A feeding device which is formed in the middle of a feeding course of this feeding pipe, and sends said welding cable core into said welding machine.

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application]This invention relates to the welding robot which attached the welding machine at the tip of the arm which can be displaced free by the joint movement.

#### [0002]

[Description of the Prior Art]The thing provided with the arm which performs a joint movement of the welding robot used when welding automatically in the factory line of a car, etc. is common. From two or more arm constructs, an arm becomes, is bent, and it is constituted so that free displacement can be performed to a three dimensional direction by compound movement of rotation of the circumference of an axis, etc. And the welding machine which welds using a wire-like welding cable core is attached at the tip of an arm. The feeding pipe which has the flexibility by which a welding cable core is inserted in as a means for feeding a welding cable core between the source of cable core feeding and welding machine which twisted the welding cable core around the drum or the reel is cabled, and. In the middle of the cable wiring path of this feeding pipe, a welding cable core is pulled out from the source of cable core feeding, the feeding device which lets out a welding cable core to a welding machine intervenes, and it is usually being fixed to one of arm constructs. The delivery mechanism in which this feeding device is sent out to one way on both sides of a welding cable core, for example with the feed roller of a pair is used.

[0003]

[Problem to be solved by the invention]In the above-mentioned welding robot, it is sent by not pulling a welding cable core from the welding machine side, and pushing it out from a feeding device within the feeding pipe between a feeding device and a welding machine. Thus, in the type which supplies a cable core by extrusion to a welding machine, we are anxious about comparing with the type pulled and supplied, and a cable core being caught within a feeding pipe between a feeding device and a welding machine, and being unable to supply a cable core to it stably. Therefore, in order to aim at stable feeding of a welding cable core, to bring the fitting location of a feeding device close to a welding machine as much as possible, and to shorten the cabling length of the feeding pipe between a feeding device and a welding machine is desired. However, when the cabling length of a feeding pipe is shortened too much, there is a possibility that the curvature of a curve of a feeding pipe may become excessive by the method of displacement of an arm. Since a welding cable core becomes being hard to pass or passage becomes impossible, it will be stabilized and it will become impossible to feed a welding cable core into a welding machine in the portion, if the curvature of a curve of a feeding pipe becomes large too much. Thus, since the feeding device was able to be made to have been able to approach a welding machine and the conditions of shortening the cabling length of a feeding pipe, and the conditions of avoiding the curvature of a curve of a feeding pipe becoming excessive were not able to be reconciled on a high level in the conventional welding robot, it was difficult to be stabilized and to feed a welding cable core.

[0004]The invention in this application is originated in light of the above-mentioned circumstances, and making it possible to shorten the cabling length of the feeding pipe between a feeding device and a welding machine, the curvature of a curve of a feeding pipe prevents and has becoming excessive, and it aims at realizing adequate supply of a welding cable core.

[0005]

[Means for solving problem]What is characterized by that this invention comprises the following as a means for solving an aforementioned problem.

The arm provided by the joint movement so that the displacement to the free direction was possible. The welding machine which is attached at the tip of this arm and welds using a wire-like welding cable core. The feeding pipe which has the flexibility in which a welding cable core is inserted.

It is the feature to the place considered as the composition which as for this feeding device is attached so that it consists of a feeding device which is formed in the middle of the feeding course of this feeding pipe, and sends a welding cable core into a welding machine and the displacement to the direction which decreases the curvature of said feeding pipe to an arm is possible.

[0006]

[Function]In this invention, if a welding machine and a feeding device approach greatly with displacement of an arm or the relative attitude of a welding machine and a feeding device changes, between a welding machine and a feeding device, a feeding pipe will maintain the state of curving with small curvature, from a feeding device carrying out a relative displacement to an arm.

[0007]

[Effect of the Invention]Since the feeding device was made to carry out the relative displacement of this invention to the arm with the relative position of a welding machine and a feeding device, and change of a posture, Even if it shortens the cabling length of the feeding pipe from a feeding device to a welding machine,

it becomes possible to keep the curvature of the curve small, and by this, it is stabilized and feeding to the welding machine of a welding cable core can be performed.

[0008]

[Working example]

Below <Embodiment 1> describes one embodiment which materialized this invention with reference to drawing 1 thru/or drawing 3. It is supported by the installing surface 1 established above the welding booths so that the frame 30 may rotate the 1st axis 41 of a sliding direction as a center, [ the 1st arm construct 31 prolonged in a slanting lower part from the frame 30 ] It is supported so that the rocking drive of the 2nd arm construct 32 may be carried out in the direction of order a center [ the 2nd horizontal axis 42 ], and it is supported by the lower limit of this 2nd arm construct 32 so that the rocking drive of the 3rd arm construct 33 may be carried out a center [ the 3rd axis 43 parallel to the 2nd axis 42 ] in a sliding direction.

[0009]Between the back end of this 3rd arm construct 33, and said 2nd axis 42, the two auxiliary arm constructs 37 and 38 are connected, and with these auxiliary arm constructs 37 and 38, The 2nd arm construct 32 and the 3rd arm construct 33 will constitute the parallel link of Section 4, and can stabilize operation of the arm construct by the side of a tip, the welding machine 5, and also feeding device 7 grade from the 3rd arm construct 33 by this. It is supported by the front end of the 3rd arm construct 33 so that the 4th arm construct 34 which extends from this 3rd arm construct 33 to the front further may rotate the 4th axis 44 of the length direction of both the arm constructs 33 and 34 as a center. It is supported by the front end of this 4th arm construct 34 so that the rocking drive of the 5th arm construct 35 may be carried out a center [ the 5th axis 45 parallel to the 2nd axis 42 and the 3rd axis 43 ]. It is supported by this 5th arm construct 35 so that the supporter 36 to which the welding machine 5 mentioned later is attached may rotate the 6th axis 46 of the length direction of the 5th arm construct 35 as a center.

[0010]The welding robot's arm 2 is constituted by the above. This arm 2 can control now arbitrarily the position and posture of the supporter 36 over the base material (welded part material) which displacement is possible free and is not illustrated in a three dimensional direction by the joint movement centering on each axes 41 thru/or 46.

[0011]Next, the device for welding is explained. The torch 5a is formed in the welding machine 5 attached to the supporter 36 so that it may project toward the base material side. Have the torch 5a and the nozzle (not shown) for supplying a welding cable core (not shown) and inactive gas, [ the torch 5a ] The power cable which is not illustrated for generating an arc between a base material and a welding cable core is connected, and the feeding pipe 6 for feeding a welding cable core from the source of welding cable core feeding which is not illustrated is connected.

[0012]It has flexibility, the welding cable core which can be crooked for the shape of a wire is inserted in the inside, and the feeding pipe 6 consists of the feeding pipe 6a by the side of the welding machine 5, and the feeding pipe 6b by the side of the source of feeding. Both the feeding pipes 6a and 6b are connected by passing the feeding device 7, and the feeding course of the welding cable core is constituted by this both feeding pipes 6a and 6b and feeding device 7.

[0013]The feeding device 7 consists of a motor (not shown) which rotates the feed roller (not shown) and this feed roller of the pair which sandwiches a welding cable core, for example, A welding cable core is pulled from the source of feeding by rotating both feed rollers, and as it pushes out to the welding machine 5 side, the feeding device 7 is passed, and it has, and has the composition of sending a welding cable core into the torch 5a at the rate of predetermined.

[0014]The attachment is made, as this feeding device 7 is arranged on the 3rd arm construct 33 and it is shown in drawing 3. As shown in the figure, the fixed base 71 which bends a plate material to L type and is fabricated so that the side and undersurface may be met is attached to the 3rd arm construct 33. This fixed base 71 is being fixed using the plate 73 arranged so that the bolt 72 and the fixed base 71 which make L type allotted to the vertical angle on both sides of the 3rd arm construct 33 might be supported from the bottom. The level shaft 74 parallel to the 2nd axis 42, the 3rd axis 43, and the 5th axis 45 is being fixed to the side of the 3rd arm construct 33 of this fixed base 71, and the corresponding side wall part 78 in the state of projecting to the side of the 3rd arm construct 33. It is fitted in rotation freedom when the housing 75 passes the bearing 77 at this shaft 74. Via the mounting member 79, the tabular movable base 76 is attached to this housing 75 so that rotation is really possible. The installing surface 76a of this movable base 76 is parallel to the axis direction of the shaft 74, and is the field which carried out eccentricity from the axial center. It is being fixed to this installing surface 76a by the fixing means which the above-mentioned feeding device 7 does not illustrate.

[0015]It fixes and said both feeding pipes 6a and 6b are connected to the feeding device 7 so that it may project in the direction which intersects the axis direction of the shaft 74. By this composition, the connecting end section to the feeding device 7 of both the feeding pipes 6a and 6b can be rotated in the field which intersects the shaft 74 in the side of the 3rd arm construct 33.

[0016]Next, an operation of this example is explained. according to the position of a base material, the arm 2 performs a joint movement -- by changing the posture and position suitably, the welding machine 5 at the tip of the arm 2 makes the torch 5a approach a base material, and will be in the state which can be welded.

[0017]At this time, if a posture is changed to the state where the torch 5a was made into slanting facing up as the welding machine 5 shows drawing 2 that torch 5a from the state shown in drawing 1 carried out downward [ slanting ], while the connecting end section to the welding machine 5 of the feeding pipe 6a changes a posture, it will approach to the feeding device 7. Although the power changed so that the curvature of the curve may become large acts on the feeding pipe 6a in connection with this, it is going to prolong the feeding pipe 6a against this so that curvature may be made small according to the stability produced with the flexural rigidity. This stability acts on the feeding device 7 side, the feeding device 7 rotates relatively to the counterclockwise rotation (left-handed rotation) of drawing 2 to the 3rd arm construct 33 by this focusing on the shaft 74, and the feeding pipe 6a maintains the state of curving smoothly with small curvature.

[0018]Thus, since the curvature of a curve of the feeding pipe 6a is prevented from becoming excessive when the feeding device 7 carries out rotation displacement to the arm 2, it can be managed with this example even if it does not lengthen the cabling length of the feeding pipe 6a between the feeding device 7 and the welding machine 5. That is, the state of curving smoothly with the small curvature can be maintained shortening the cabling length of the feeding pipe 6a, thereby, the feeding function of the feeding device 7 can fully be demonstrated, and a welding cable core can be stabilized and fed into the welding machine 5.

[0019]It is not limited to the embodiment described with the above-mentioned description and Drawings, and the following embodiments are also included in the technical scope of this invention, for example, and further, within limits which do not deviate from a gist besides the following, <other embodiments> this invention can be changed variously and can be carried out.

[0020](1) Although the feeding device 7 is only supported by rotation freedom by the shaft 74 and the case where it had composition which the feeding device 7 rotates according to the stability produced with the flexural rigidity which the feeding pipe 6a has was explained in the above-mentioned embodiment, In this

invention, the drive mechanism for displacing a feeding device positively is formed, displacement of an arm is interlocked with and this drive mechanism is operated.

Therefore, the composition which displaces a feeding device is also included in a technical scope.

Since the load to a feeding pipe will be reduced if it does in this way, useful life longevity of a feeding pipe can be lengthened.

[0021](2) Although the above-mentioned embodiment explained the case where the feeding device 7 was supported so that rotation displacement in the two-dimensional plane which intersects perpendicularly with the shaft 74 is possible, The composition which rotates this invention to a three dimensional direction by biaxial [ biaxial and the method of displacement of a feeding device cross at right angles ], Various kinds of movement formations other than the above-mentioned embodiment, such as composition which carries out parallel translation in the direction which intersects the length direction of the 2nd arm construct or this, and composition which combined rotation and parallel translation of the three dimensional direction, are also included in a technical scope. Even in this case, it is possible like the above-mentioned modification (1) to displace a feeding device with drive mechanism.

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#### [Brief Description of the Drawings]

[Drawing 1]The side view of one embodiment of this invention

[Drawing 2]The side view showing the state where the arm was displaced

[Drawing 3]The sectional view showing the mounting structure to the arm of a feeding device

[Explanations of letters or numerals]

2 -- Arm

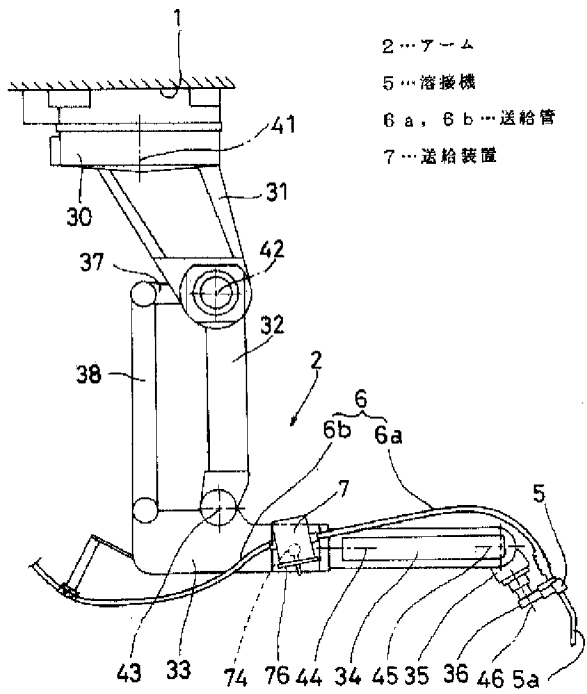
5 -- Welding machine

6a, 6b -- Feeding pipe

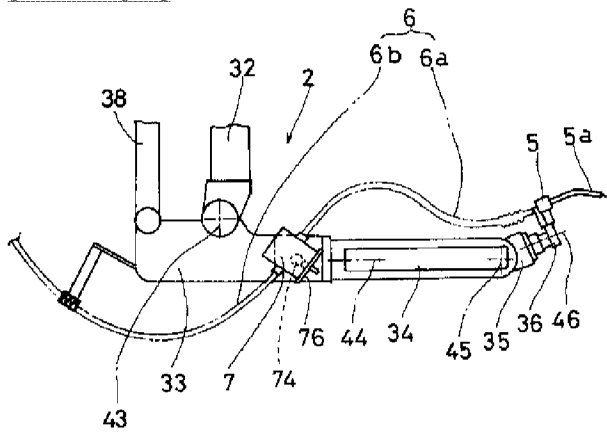
7 -- Feeding device

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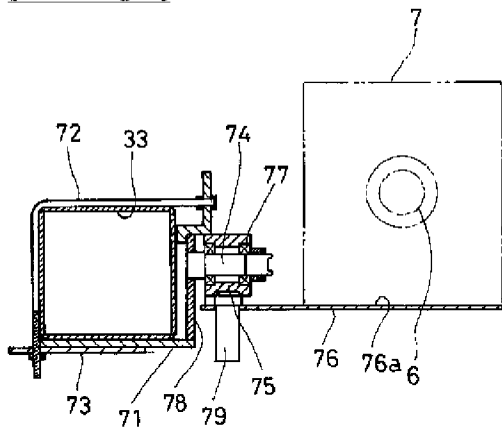
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]